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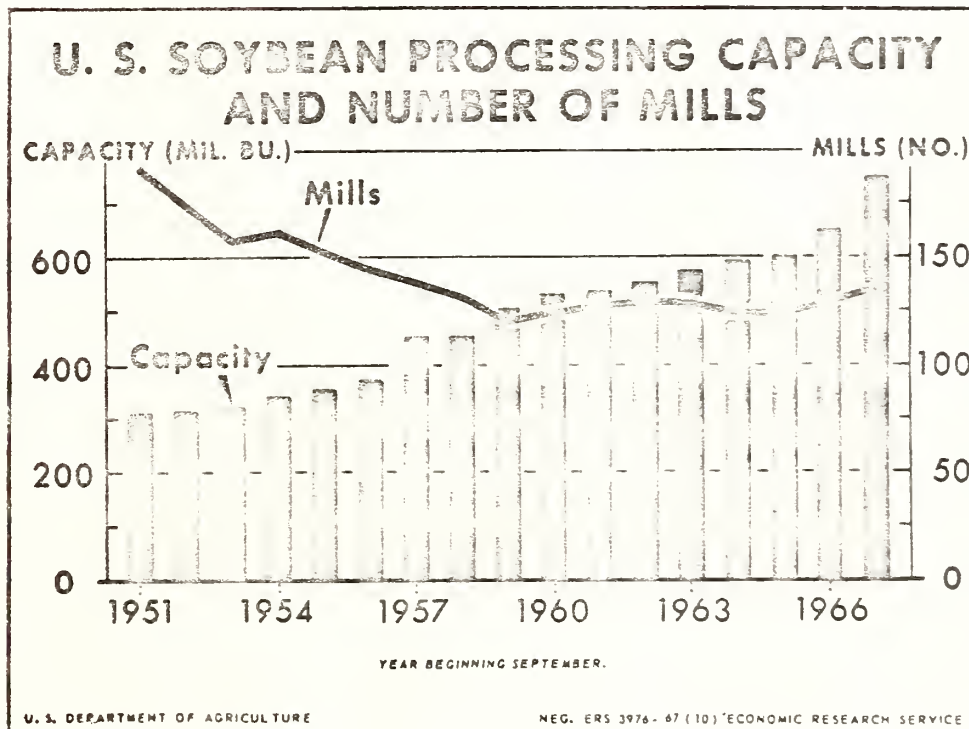
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U.S. SOYBEAN PROCESSING CAPACITY CONTINUES EXPANSION

By
George W. Kromer



The U.S. soybean processing industry continues to expand its plant capacity--to an estimated 750 million bushels during 1967/68. This is nearly 2 1/2 times capacity in 1951/52. The efficiency and capacity per plant increased markedly during this period, as the number of processing mills declined from 193 in 1951/52 to 135 in 1967/68.

Soybean crushings have increased in about the same proportion as processing capacity, but every year there has been unused capacity. During the 1951-66 period, the ratio of utilized capacity (crushings) to total capacity has averaged about 80%. (See page 35).

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U.S. SOYBEAN PROCESSING CAPACITY CONTINUES EXPANSION

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George W. Kromer

The U.S. soybean industry has expanded its processing capacity rapidly--from 310 million bushels in 1951/52 to an estimated 750 million during 1967/68, according to trade sources. Processors have continued to anticipate increases in soybean production and their growing markets for soybean oil and meal. On a monthly basis, the 1967/68 processing capacity is estimated at about 62.5 million bushels compared with 55 million in 1966/67.

Soybean processing capacity has substantially exceeded the volume crushed despite the sharp upward trend in soybean production and the reduction in the number of plants. The excess capacity results primarily from the building of larger and more efficient mills and enlargement of facilities of already active mills. These changes occurred as plants shifted from older mechanical methods of

crushing soybeans to the more efficient solvent processing. This has given greater versatility to processing facilities, and makes it easier for a mill to process more than 1 type of oilseed during the season. With the construction of large solvent extraction mills and the advent of the horizontally integrated processor (mixed feed-crushing operation), processors' margins were generally reduced from 23 cents per bushel in 1957-1958 to 15 cents for the industry as a whole in 1966/67. ^{1/} Solvent extraction is the more efficient processing technique and currently used for more than 95% of all soybeans processed in this country.

^{1/} Processors' margins as used here represent the spot spread between the price paid by crushers for soybeans and the combined value of soybean products (oil and meal). This calculation is based on simple averages of monthly cash prices as shown in table 26.

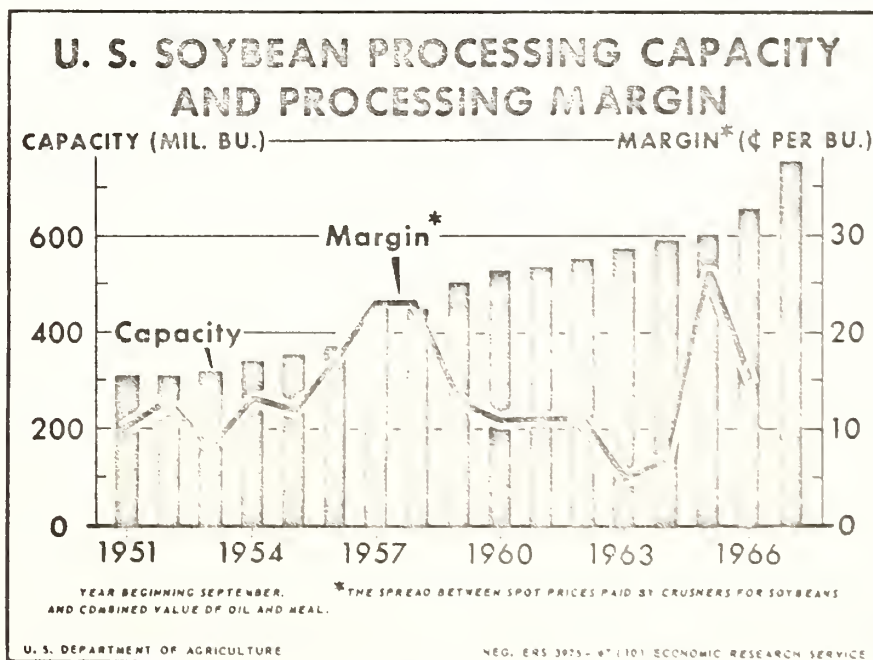


Figure 1

Table 25.--Estimated number of soybean oil mills and processing capacity in the United States, 1951-67

Year beginning September	Process- ing mills 1/	Processing capacity				Average per mill	
		Total	Utilized	Excess	Ratio	Processing	Capacity
		2/	3/	4/	of utilized to total	Capacity	utilized 3/
	Number	Mil. bu.	Mil. bu.	Mil. bu.	Pct.	Mil. bu.	Mil. bu.
1951	193	310	244	66	79	1.6	1.3
1952	174	(315)	234	81	74	1.8	1.3
1953	159	(320)	218	102	68	2.0	1.4
1954	162	(340)	241	99	71	2.1	1.5
1955	152	(355)	282	73	79	2.3	1.9
1956	144	370	314	56	85	2.6	2.2
1957	139	450	351	99	78	3.2	2.5
1958	130	450	399	51	89	3.5	3.1
1959	121	500	394	106	79	4.1	3.2
1960	123	525	406	119	77	4.3	3.3
1961	126	(535)	431	104	81	4.2	3.4
1962	128	550	473	77	86	4.3	3.7
1963	127	575	437	138	76	4.5	3.4
1964	123	585	479	106	82	4.8	3.9
1965	124	600	537	63	89	4.8	4.3
1966	128	650	551	99	85	5.1	4.3
1967	135	750	5/600	150	80	5.5	4.4

1/ Estimates developed from Census data and trade directories. Includes cottonseed and other oilseed mills that process significant quantities of soybeans.

2/ Trade estimates 1958 to date (except 1961). Data in brackets are USDA interpolations.

3/ Soybeans actually crushed.

4/ Difference between total capacity and soybeans utilized (crushed).

5/ Forecast.

Table 26.--Soybeans: Value of products per bushel of soybeans processed and price spread, 1947-66

Year beginning September	Value of Products Per Bushel							Soybean price		Spread between value of products and soybean price	
	Soybean Oil			Soybean Meal			Total Value	Received by farmers	No. 1 yellow, Illinois points	Received by farmers	No. 1 yellow, Illinois points
	Yield	Price 1/	Value	Yield	Price 1/	Value					
	Pounds	Cents	Dollars	Pounds	Cents	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars
1947	9.5	23.4	2.22	47.5	4.15	1.97	4.19	3.33	3.69	.86	.50
1948	9.8	14.0	1.37	47.2	3.29	1.55	2.92	2.27	2.41	.65	.51
1949	9.9	12.0	1.19	46.9	3.28	1.54	2.73	2.16	2.50	.57	.23
1950	9.7	17.9	1.74	46.8	3.16	1.48	3.22	2.47	2.95	.75	.47
1951	10.0	11.6	1.16	46.7	4.07	1.90	3.06	2.73	2.96	.33	.10
1952	10.8	12.0	1.30	47.3	3.52	1.66	2.96	2.72	2.83	.24	.13
1953	11.0	13.4	1.47	47.4	3.90	1.85	3.32	2.72	3.24	.60	.68
1954	10.9	12.2	1.33	45.9	3.06	1.40	2.73	2.46	2.60	.27	.13
1955	11.1	12.5	1.39	46.2	2.68	1.24	2.63	2.22	2.51	.41	.12
1956	10.9	12.7	1.38	47.5	2.36	1.12	2.50	2.18	2.33	.32	.17
1957	10.8	11.0	1.19	46.8	2.64	1.24	2.43	2.07	2.20	.36	.23
1958	10.6	9.6	1.02	47.3	2.82	1.33	2.35	2.00	2.12	.35	.23
1959	11.0	8.3	.91	46.5	2.77	1.29	2.20	1.96	2.07	.24	.23
1960	11.0	11.2	1.23	47.0	3.00	1.41	2.64	2.13	2.53	.51	.21
1961	10.9	9.7	1.06	47.2	3.11	1.47	2.53	2.38	2.41	.25	.12
1962	10.7	8.8	.94	46.9	3.57	1.67	2.61	2.34	2.50	.27	.12
1963	10.9	8.4	.92	48.0	3.58	1.72	2.64	2.51	2.59	.13	.05
1964	10.9	11.2	1.22	47.7	3.48	1.66	2.68	2.62	2.81	.26	.07
1965	10.7	11.8	1.26	47.5	4.02	1.91	3.17	2.54	2.91	.63	.26
1966 2/	10.7	10.4	1.11	47.7	3.98	1.90	3.01	2.77	2.86	.24	.15

1/ Simple average price per pound using the following quotation: Soybean oil, crude, tank cars, f.o.b. Decatur; soybean meal, bulk, Decatur, quoted as 41 percent prior to July 1950, 44 percent beginning July 1950.

2/ Preliminary.

Volume of Soybeans Crushed Averages
80% of Capacity

Soybean crushings have increased in about the same proportion as processing capacity. Crushings in 1951/52 were 244 million bushels (capacity was 310 million) compared with the 1967/68 forecast of around 600 million bushels (capacity is placed at 750 million). During the entire period, the ratio of utilized capacity (actual crushings) to total capacity has averaged about 80% (table 25).

The estimated number of mills processing soybeans declined from 193 in 1951/52 to 135 during 1967/68, a decrease of 58 plants or approximately 30%. But at the same time, the average annual processing volume per mill increased from 1.3 million bushels in 1951/52 to 4.4 million in 1967/68, or by about 238%. Operations on a larger scale enable processors to take advantage of savings arising from both the processing of soybeans and the marketing of products.

Soybean processing plants are concentrated in the main areas of soybean production. In the early 1950's, nearly two-thirds of the soybean mills in the United States were located in the soybean-corn belt States and one-third outside this region--the Plains States, lower Mississippi Valley, Middle Atlantic States, and the Southeast. By 1967, however, the 135 soybean processing mills were about equally distributed between the central soybean-corn belt and production areas outside the central States.

Proportion of Soybean Crop Crushed
Declines as Exports Expand

In 1953, about 81 percent (218 million bushels) of the soybean crop (269 million bushels) was processed at domestic soybean oil mills, and 15 percent (40 million bushels) was exported as beans (table 27). Since then, the volume of domestically processed soybeans has increased at an average annual rate of about 8 percent, while the volume of soybean exports grew about 16 percent annually. In 1967, an estimated 60 percent

of the soybean crop will be processed domestically and about 30 percent will be exported as beans. In recent years, feed use has accounted for about 5-6 percent of the total soybeans produced annually.

Domestic Use Accounts for
80 Percent of Soybean Oil Output

Annual domestic disappearance of soybean oil currently accounts for about 80 percent of the soybean oil produced in the United States, and exports about 20 percent (table 28). Prior to the enactment of P.L. 480 in 1954, a law which authorized Government-financed exports of edible oil to underdeveloped nations, the proportion of soybean oil used at home was considerably greater. Each year since the beginning of the program in 1954, edible vegetable oils (soybean and cottonseed) have been designated as a surplus commodity available for export for foreign currencies under P.L. 480.

As may be seen in table 29, total soybean oil exports, when including the oil equivalent of exported soybeans, increased from 0.5 billion pounds in 1953/54 to 3.9 billion in 1966/67. On this overall oil and oil equivalent basis, over 75% of soybean oil exports are for dollars and less than 25% under programs.

Soybean Meal Exports Trend Upward

Domestic use of soybean meal has increased from 5.1 million tons (98% of total U.S. production) in 1953/54 to 10.5 million tons (80% of production) during 1966/67. Domestic use of soybean meal is almost exclusively for feed. The largest portion of soybean meal use has been in poultry feeds, although the biggest increase in consumption recently has been in hog feeds. Factors primarily responsible for the rapid expansion of U.S. soybean meal consumption have been increasing livestock numbers, increased feeding of high protein concentrates per animal unit, and the rapid expansion of the mixed feed industry.

Soybean meal exports increased from 73,000 tons in 1953/54 to nearly 2.7

Table 27.--Soybeans: Production, disposition, and value of products, year beginning September 1, 1953-67

Year beg. Sept. 1	Disposition 1/							Value of products per bushel of soybeans crushed 2/				
	Production:		Disposition 1/		Disposition 1/			Soybean:		Soybean:		Total
	Actual:	% of production	Actual:	% of production	Actual:	% of production	Actual:	Oil (crude):	% of (bulk)	Total	Oil	
	Mil. bu.	Mil. bu.	Pct.	Mil. bu.	Pct.	Mil. bu.	Pct.	Dol.	Dol.	Dol.	Pct.	Pct.
1953	269.2	217.8	81	40.1	15	22.9	8	1.47	1.85	3.32	44	56
1954	341.1	241.4	71	57.3	17	23.4	7	1.33	1.40	2.73	49	51
1955	373.7	281.9	75	68.6	18	25.8	7	1.39	1.24	2.63	53	47
1956	449.3	313.6	70	83.7	19	26.4	6	1.38	1.12	2.50	55	45
1957	483.4	350.9	73	88.4	18	29.5	6	1.19	1.24	2.43	49	51
1958	580.2	398.8	69	105.0	18	27.4	5	1.02	1.33	2.35	43	57
1959	532.9	394.0	74	139.9	26	29.3	5	.91	1.29	2.20	41	59
1960	555.1	406.1	73	134.7	24	32.5	6	1.23	1.41	2.64	47	53
1961	678.6	431.4	64	149.4	22	33.3	5	1.06	1.47	2.53	42	58
1962	669.2	472.7	71	180.5	27	34.6	5	.94	1.67	2.61	36	64
1963	699.2	436.8	62	187.2	27	36.0	5	.92	1.72	2.64	35	65
1964	706.9	479.0	68	212.2	30	40.3	6	1.22	1.66	2.88	42	58
1965	845.6	537.5	64	250.6	30	42.9	5	1.26	1.91	3.17	40	60
1966	931.5	551.3	59	257.1	28	46.6	5	1.11	1.90	3.01	37	63
1967 3/	997.7	600	60	290	29	47	5					

1/ Disposition totals for individual years may exceed production due to stock changes. 2/ See table 25 for method of computing. 3/ Production indicated October 1. Disposition is forecast.

Table 28.--Soybean oil and meal: Production and disposition, and bean equivalent of exports, year beginning September 1, 1953-67

Year beg. Sept. 1	Soybean Oil						Soybean Meal					
	Production:		Disposition 1/				Production:		Disposition 1/			
	Actual:	% of production	Actual:	% of production	Actual:	% of production	Actual:	% of production	Actual:	% of production	Actual:	% of production
	Mil. lb.	Mil. lb.	Pct.	Mil. lb.	Pct.	Mil. bu.	1,000 tons	1,000 tons	Pct.	1,000 tons	Pct.	Mil. bu.
1953	2,399	2,369	99	77	3	7	5,162	5,056	98	73	1	3
1954	2,630	2,585	98	49	2	4	5,534	5,368	97	247	4	11
1955	3,128	2,582	83	483	15	44	6,516	6,042	93	397	6	17
1956	3,408	2,494	73	856	25	78	7,452	7,052	95	452	6	19
1957	3,774	3,023	80	728	19	66	8,210	7,921	96	300	4	13
1958	4,224	3,278	78	899	21	82	9,434	8,921	95	496	5	21
1959	4,337	3,352	77	1,058	24	96	9,170	8,537	93	640	7	28
1960	4,465	3,292	74	719	16	65	9,538	8,847	93	606	6	26
1961	4,709	3,556	76	1,218	26	111	10,161	9,217	91	1,042	10	44
1962	5,079	3,712	73	1,145	23	104	11,095	9,579	86	1,439	13	61
1963	4,769	3,903	82	1,124	24	102	10,488	9,088	87	1,415	13	59
1964	5,215	4,097	79	1,362	26	124	11,439	9,102	80	2,105	18	83
1965	5,747	4,685	82	974	17	89	12,772	10,176	80	2,616	20	110
1966	5,905	4,665	79	1,062	18	97	13,164	10,524	80	2,659	20	111
1967	6,400	5,100	80				14,200	11,350	80			

1/ Disposition totals for individual years may exceed production due to stock changes. 2/ Based on 11.0 pounds of oil and actual output of meal per bushel.

Table 29.--Soybeans, soybean oil, and soybean meal: U.S. exports as such and as oil and meal equivalent, year beginning September 1, 1953-67

Year beg. Sept. 1	Soybean exports			Soybean oil exports			Soybean meal exports		
	Actual:		Meal equivalent of soybeans 2/	Actual:		Total oil equiv.	Actual:		Total meal equiv.
	Mil. bu.	Mil. lb.		Mil. lb.	Mil. lb.	Mil. lb.	1,000 tons	1,000 tons	1,000 tons
1953	40.1	441	951	77	441	518	73	951	1,004
1954	57.3	630	1,315	49	630	679	247	1,315	1,562
1955	68.6	754	1,584	483	754	1,237	397	1,584	1,981
1956	83.7	921	1,989	856	921	1,777	452	1,989	2,441
1957	88.4	972	2,068	728	972	1,700	300	2,068	2,368
1958	105.0	1,155	2,483	899	1,155	2,054	496	2,483	2,979
1959	139.9	1,539	3,253	1,058	1,539	2,597	640	3,253	3,893
1960	134.7	1,481	3,165	719	1,481	2,300	606	3,165	3,771
1961	149.4	1,644	3,526	1,218	1,644	2,862	1,042	3,526	4,568
1962	180.5	1,985	4,232	1,145	1,985	3,130	1,439	4,232	5,671
1963	187.2	2,060	4,494	1,124	2,060	3,184	1,415	4,494	5,900
1964	212.2	2,334	5,071	1,362	2,334	3,696	2,105	5,071	7,176
1965	250.6	2,757	5,952	974	2,757	3,731	2,616	5,952	8,568
1966	257.1	2,829	6,133	1,062	2,829	3,891	2,659	6,133	8,792
1967	290	3,200	6,900						

1/ Based on 11.0 pounds of oil per bushel of soybeans. 2/ Based on actual output of meal per bushel of soybeans.

million tons 1966/67. Between 1953 and 1960, soybean meal exports averaged only about 5 percent of total production. Since 1960, however, exports of soybean meal have been increasing rapidly, reaching 20 percent of production in 1966/67. Rising animal numbers in foreign nations, (especially Western Europe), growing acceptance of vegetable protein in livestock rations, and high-quality of U.S. toasted soybean meal have contributed to this increase.

While soybean meal exports in meal form have expanded sharply in recent years, most U.S. meal is still exported in the form of soybeans (table 29). During the 1966/67 marketing year, about 8.8 million tons of soybean meal (including the meal equivalent of 257 million bushels of soybeans) was exported. Of this total, 2.7 million tons, or 30 percent, was exported as meal whereas 6.1 million tons, or 70 percent, were exported as soybeans.

OUTLOOK

The soybean processing industry will continue to expand facilities in anticipation of larger supplies and excess capacity will continue to exist. Trends toward larger mills, the integration of soybean crushings with feed-mixing and other integrated activities, and excess processing capacity all will tend to keep continued pressure on processing margins.

In the long run, any sizable future expansion in U.S. output of edible fats and oils and meal will come primarily from soybeans. Soybeans are grown as a direct source of oil and meal, whereas competitive cottonseed is a byproduct of the cotton industry and lard is a byproduct of pork production. Demand prospects suggest a continued uptrend for soybeans and products at a rate greater than the growth in population. Thus, the soybean processing industry likely will make further significant gains as soybeans play an even greater role in the fats and oils economy.

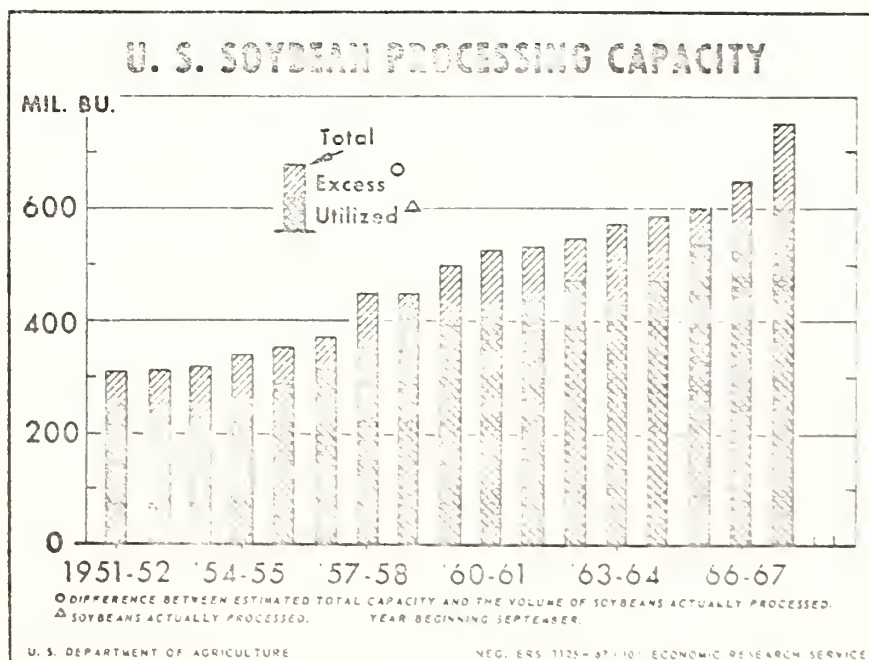


Figure 2
